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CERTIFIED MAIL – RETURN RECEIPT REQUESTED

May 25, 2005

Mr. Ned Hall, Manager
Environment, Land and Water
Chino Mines Company
210 Cortez Street
Hurley, New Mexico 88043

RE: Supplement to the Ground Water Quality Bureau Statement of Position, Formal Dispute Resolution, Hurley Soils Investigative Unit, Pre-Feasibility Study Remedial Action Criteria

Dear Mr. Hall:

The Ground Water Quality Bureau (Bureau) of the New Mexico Environment Department received a May 4, 2005 letter submitted by Chino Mines Company (Chino) providing supplemental information to its March 31, 2005 Statement of Position for Formal Dispute Resolution regarding the Pre-Feasibility Study Remedial Action Criteria (Pre-FS RAC) for the Hurley Soils Investigation Unit (HSIU). Chino maintains in the May 4, 2005 letter that the supplemental information provided by Chino supports a Pre-FS RAC in the range of 6,300 to 8,900 mg/kg copper in soils. The Bureau in consultation with its expert in the area of human health risk assessment, Gradient Corporation (Gradient), has reviewed the supplement to Chino's Statement of Position. By this letter, the Bureau, as the responding party, supplements its Statement of Position dated April 25, 2005.

Pursuant to Article XII.C.2 of the Chino Administrative Order on Consent (AOC), the Bureau previously submitted a Statement of Position in response to Chino's Statement of Position by letter dated April 25, 2005. It was recommended in the Bureau's Statement of Position that the Pre-FS RAC of 2,000 mg/kg copper in soil be increased to 3,100 mg/kg copper in soil.

Chino's supplement to its Statement of Position was based on comments received from Blasland, Bouck, and Lee, Inc. (BBL), and additional analysis and modeling performed by Linea, Inc. (Linea). The Bureau's analysis of Chino's supplemental information focused on parameters with potential for the greatest impact on the Pre-FS RAC. These parameters include selection of the threshold for the acceptable exposure concentration (AEC) distribution for copper in the stomach, the shape of the AEC distribution, apportionment of soil ingestion into food-mediated and non food-mediated components, and the hourly soil ingestion rate. The Bureau's specific responses to Chino's supplement to their Statement of Position are provided below.

Threshold for the AEC Distribution

Chino contends that the No-Observed-Adverse-Effect-Level (NOAEL) for the AEC should be 4 mg/L rather than 2 mg/L, because the more recent study by Araya et al. (2003) reported a NOAEL of 4 mg/L; and because a statistically significant NOAEL for the study by Olivares et al. (2001) is 4 mg/L rather than 2 mg/L, based on a Fisher Exact Test, as compared with a 5% basal response for nausea.

The Bureau, in consultation with Gradient, selected a NOAEL of 2 mg/L for the AEC distribution based on a weight of evidence from studies by Araya *et al.*, 2001, 2003, and Olivares *et al.*, 2001. This value was selected because the study by Olivares *et al.* identified a NOAEL of 2 mg/L. Although the Araya studies identified a NOAEL of 4 mg/L, data from these studies provide evidence that the response rate at 4 mg/L is clearly distinguishable from that at 0 or 2 mg/L. Moreover, the response rate at 4 mg/L approached statistical significance, with a probability value< 0.07, for Araya *et al.*, 2001 (i.e., the probability that the response at 4 mg/L is the same as that at 0 mg/L is less than 7%). A subsequent study by Araya *et al.* (2004) also observed a statistically significant response at 4 mg/L. According to BBL, Olivares *et al.* did not report any statistical analyses regarding significance of the response at 2 or 4 mg/L. However, Olivares *et al.* do specify that statistical analyses included the Fisher exact test and logit regression, and thus it is reasonable to assume that the Least-Observed-Adverse-Effect-Level (LOAEL) and NOAEL reported by Olivares *et al.* were based on their statistical analysis. Furthermore, the Bureau believes that it is not appropriate to use the Fisher exact test to compare responses in the study by Olivares *et al.* to a basal response rate of 5%. Rather, the response rate at each dose in the study by Olivares *et al.* should be compared to the response rate at 0 mg/L. Therefore, this suggested change by BBL is not justified and would increase the overall uncertainty of the risk assessment.

Shape of the AEC Distribution

Chino contends that the AEC distribution should increase gradually from the minimum threshold, rather than abruptly, and that the distribution used by the Bureau could only occur if the threshold for a substantial portion of the population occurred immediately above the minimum threshold.

The AEC distribution, which represents the probability that a given concentration of copper in the stomach is a NOAEL, was based on data from the studies discussed above by Araya *et al.* (2001, 2003) and Olivares *et al.* (2001). Thus, the probability shown on the AEC distribution at 1.4 mg/L (2 mg/L copper in drinking water adjusted for the volume of gastric juice in the stomach) represents the actual probability that 1.4 mg/L is a NOAEL, based on this data. Note that the distribution used by the Bureau's risk assessment indicates that the probability that 1.4 mg/L is a NOAEL is only approximately 3%, and that the peak incremental response occurs at approximately 7 mg/L. Subsequently there is approximately a 5% probability that 7 mg/L is a NOAEL. Hence, the AEC distribution the Bureau used in the RAC analysis does not increase abruptly, as stated by Linea, but rather increases gradually as Linea notes that it should. Based on these considerations, the Bureau has determined that the AEC distribution used for calculating the RAC is appropriate.

Food-Mediated Soil Ingestion

Chino apportions total daily soil intake into food-mediated, and non-food mediated components, assuming that ⅓ of the total daily soil intake is food-mediated, as a conservative assumption.

The model that the Bureau used for the RAC analysis does allow for soil ingestion to occur when food is also being ingested, without specifying the exact amount of soil intake that is food-mediated. While the recommendation that soil ingestion should be apportioned into food-mediated and non-food mediated components is intriguing, Chino has provided no data to support such an apportionment – *e.g.*, diary information on patterns of hand washing, meal consumption and outdoor play would potentially be relevant. Therefore, in the absence of any data to quantify the percentage of daily soil intake that is food-mediated, apportioning ⅓ of the soil intake as being food-mediated is arbitrary and is not justified.

Hourly Soil Ingestion

Chino contends that the distribution of hourly soil ingestion rates based on the data by Zartarian et al. (1998) will underestimate soil ingestion rates for children who may be awake for a 13.5 hour day, and that total daily soil intake would be reached in approximately 8 hours on average, based on the average hourly soil ingestion fraction of 0.12 from the distribution of hourly soil ingestion rates. Hence, Chino adjusts the distribution of hourly soil ingestion rates by a factor of 1.5.

Hourly soil ingestion rates for the RAC analysis were based on object-to-mouth contact rates for four children who were videotaped during their waking hours, in a study by Zartarian *et al.* (1998). There is uncertainty regarding whether the contact rates observed by Zartarian *et al.* when children were videotaped would be representative of contact rates during hours when the children were not videotaped. Specifically, data from a study by Reed *et al.* (1999) suggest that there are a significant number of hours during the day when there is no object-to-mouth contact.[1] Moreover, because the distribution of hourly soil ingestion rates generated from the Zartarian data does not follow a normal distribution, it is not appropriate to use the

[1] Note that the Bureau did not include these data in their analysis because the study by Reed *et al.* did not report contact rates for individual hours, but rather reported the range, mean and median for each child.

average hourly soil ingestion fraction to estimate the number of hours required to reach the total daily soil intake. Rather, the number of hours, on average, to reach total daily soil intake should be estimated using the median or 50th percentile hourly soil ingestion fraction, which is 0.09. Using this fraction, total daily soil intake would be reached, on average, in approximately 11 hours.

Given the small difference between 13.5 and 11 hours, and the uncertainty in adjusting the Zartarian data, the Bureau believes that adjusting the Zartarian data is not warranted. The Bureau believes that this adjustment would be warranted only if it would clearly reduce uncertainty in the analysis. Chino's modeling effort and justification does not reduce this uncertainty. While this adjustment may reduce the likelihood that the hourly soil ingestion rates may overestimate actual hourly soil ingestion rates, it would conversely increase the likelihood that hourly soil ingestion rates would underestimate actual hourly soil ingestion rates. The change in this input parameter, as proposed by Linea, does not reduce the overall uncertainty to this input parameter. Therefore, changing this parameter is not justified.

CONCLUSION

Based on the above analysis, the Bureau has determined that the additional information presented in the supplement to Chino's Statement of Position does not provide significant justification to warrant a Pre-FS RAC greater than 3,100 mg/kg copper in soils. The Bureau believes that the new model parameters used by Linea, Inc. increase the overall uncertainty of the model results as compared to the Bureau's established model parameters. After reviewing Chino's supplemental information and the complete Administrative Record Index for the Hurley Soils Investigation Unit, the Bureau continues to recommend that the Pre-FS RAC of 2,000 mg/kg copper in soil be increased to no greater than 3,100 mg/kg copper in soil. The Bureau's proposed change to 3,100 mg/kg copper in soil is supported by the site-specific conditions and a probabilistic risk model that is based on the best available information and reasonable and justifiable scientific studies and assumptions necessary to protect the public health and environment of Hurley.

The Bureau would also like to comment on the statement in Chino's cover letter, dated May 4, 2004, that "Chino has proposed and the NMED has agreed, to begin remediation of those yards in Hurley with copper concentrations of over 10,000 mg/kg." It should be noted that the Bureau has agreed to review interim removal action work plans that Chino may propose for copper concentrations over 10,000 mg/kg in soil. But, the Bureau has not at this time received, reviewed, or approved any specific work plan related to remediation of soils contaminated with copper. As indicated in previous correspondence, the Bureau supports Chino's effort to begin early development of remedial alternatives. However, the Bureau's support for Chino's proposal to begin development of remedial alternatives prior to completion of the dispute resolution process in no way implies that the Bureau supports a Pre-FS RAC of greater than 3,100 mg/kg copper in soil. In addition, please be aware that since the Pre-FS RAC for the HSIU is in formal dispute, a final decision has not yet been made regarding any revisions to the existing Pre-FS RAC. The dispute resolution process may result in revisions to the Pre-FS RAC, and may have an effect on the development of remedial alternatives.

Pursuant to Article XII.C.3 of the AOC, the Technical Group has 15 working days following Chino's receipt of this letter to attempt to resolve the dispute. Please call me at 505-827-2919 to discuss any questions concerning the Bureau's supplemental response or the formal dispute resolution process.

Sincerely,

William C. Olson
Chief, Ground Water Quality Bureau

WCO:ce

Cc: Petra Sanchez, EPA Region 6
Ned Hall, Chino Mines Company
Bob North, Chairman, Chino AOC Community Working Group
Harry Browne, GRIP